On the whole we prefer the author of "What is a Joule?" to such a man as this, because we believe he does less harm, and is less likely to mislead "able editors."

There is one grain of comfort even in the imbecilities and inanities of would-be humorous writers in newspapers, that at least they have woke up to the idea that a scientific discovery is worth laughing at. This is a step gained. Twenty years ago, even ten years ago, the name of even so distinguished a scientist as Dr. Joule would have been utterly unknown to the herd of newspaper writers. We must be thankful for even this much; and look hopefully forward to the good day coming when Science will take her place by the side of her sisters, Art and Literature, as equally deserving of popular culture.

GRISEBACH'S VEGETATION OF THE GLOBE

Die Vegetation der Erde nach ihrer klimatischen Anordnung: ein Abriss der vergleichenden Geographie der Pflanzen; von A. Grisebach. 2 vol. (Leipzig: Engelmann, 1872.)

THIS important contribution to a branch of the science which, since the publication of A. de Candolle's "Géographie Botanique" and the promulgation of the Darwinian theories, has been daily acquiring greater value in the minds of philosophical naturalists, is the result of long study and persevering accumulation of data on the part of the learned author. Prof. Grisebach had already, in the "Linnæa" for 1838, given his first views on the limitation of natural floras by climatological influences; and since 1840 he has, in his periodical reports on the progress of geographical botany, entered more or less into the principles and conclusions which he has successively entertained or matured. He now supplies us in these volumes with a methodical digest of the facts he has collected, and of the conclusions he would draw from them. The result is a rich store of materials, which future investigators of the subject must necessarily have recourse to, and the arrangement adopted is perhaps the one best calculated to illustrate that branch of it which is more especially indicated by the title, the influence of climate and physical conditions on the stations and areas of species. But to the general naturalist the value of the work as a book of reference is much diminished by two great deficiencies; there is no summary of the conclusions he would draw from the facts he has detailed, and no index to enable the reader to turn to any individual fact, argument, or deduction, which may have struck him in the perusal of above 1,200 closely printed pages.

The question of the Origin of Species is not entered into, for the author believes that acknowledged facts prove nothing more than the production of varieties through climatological or other influences, but that "however interesting speculations on the genetic connections of organisms may appear, we abandon the territory of facts when we indulge in conjectures on the origin of more widely separated forms or races, of species, genera, or families of plants or animals." "That the limits between a species and a variety are not always to be strictly defined, is no reason," he observes, "why we should ascribe to both an identical process of formation, or that we should regard the forces by which the gradual variations of forms are effected as the only ones by which the multiplicity of nature has been produced."

As far as we have been able to collect the professor's views, his idea seems to be that, whatever may have been its origin, every species now existing on the globe was at some given (or uncertain) time "produced" in one particular spot, the centre of the species, from whence it has, from the natural tendency to multiplication inherent in every organised race, spread in every direction where its progress has not been checked by extraneous causes, generally by climatological or other physical opposing influences, sometimes by the mere struggle with competing races. Wherever a considerable number of species appear to have had their centres within a limited area, that area is termed a centre of vegetation (*Vegetations-centrum*); where the migration of plants from one or more centres is limited by physical obstructions, by mountain chains, seas, adverse climate, &c., the space thus enclosed is the province (*Gebiet*) of a natural flora. For the "centres of vegetation," the author had originally made use of the term "centres of creation" (*Schöpfungs-centren*), which he has now abandoned on account of the objections made to it as expressing some definite process of production. "I, at least," he adds, "under an act of creation, never understood anything else than the operation of certain laws of nature, the further knowledge of which is, as yet, withheld from us. Bentham prefers for the term 'centres of vegetation' that of 'areas of preservation,' when they remain in their original state, as in oceanic islands, a mode of expression to which we might well be reconciled" (p. 523). With regard to the term *Gebiet*, the natural translation would be *region*, but in this instance, with the facility enjoyed by Germans of adopting words of foreign languages, the word "Region" is made use of for areas limited by altitude within the *Gebiet*.

The twenty-four botanical provinces of natural floras which Grisebach had already sketched out in Petermann's *Mittheilungen* are here necessarily taken in detail, investigating under each one—(1) the climate; (2) the prevailing plant-forms; (3) the prevailing plant-formations; (4) the regions, chiefly as to altitude; and (5) the centres of vegetation included in the province. For the "plant-forms" he has carried out a classification founded on that of Humboldt, distributing plants under seven heads—(1) woody plants; (2) succulent plants; (3) climbers; (4) epiphytes; (5) herbs; (6) grasses—including sedges, reeds, &c.; (7) cellular plants: each one subdivided into minor groups. The "plant-formations" are tracts of country whose general aspect is characterised by their vegetation, such as forests, heaths, scrubs, deserts, cultivated tracts, &c.

The two provinces worked out with the greatest care, and for which the materials here collected are perhaps the most deserving of study, as being the most ample, and in both cases checked by the personal experience of the author, are the Forest-province (Waldgebiet) of the eastern continent (the greater part of Europe and temperate Asia), and the Mediterranean region; the one characterised by its vast uniformity, the other by its broken diversity; in both of which the complicated influences of climate, configuration, and soil, have been more carefully observed, recorded, and studied, than in any other quarter of the globe. The Mediterranean region is particularly instruc-

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tive, not only from the richness of the flora, but from the large number of endemic monotypes (monotypic genera or sub-genera, or widely distinct species), confined to very restricted areas, and of disjointed species—identical species in widely dissevered areas. With regard to the species of narrowly confined stations, Prof. Grisebach believes that the considerations he has brought forward tell decidedly in favour of the conclusion "that monotypes and other rare organisms are not—or, at least, are not generally—to be regarded as the surviving remains of earlier creations, but as evidences of the productive power of the localities where they are now to be found, and from whence no means of migration are within their reach" (p. 364). He can, however, scarcely have paid attention to the various proofs recorded of the gradual reduction of the areas of several Mediterranean species, even within historical times, and still more since an immediately preceding geological epoch—that of the formation of the tufas of the south of France. He does not, indeed, seem to be aware of the instructive memoirs on this subject of Gustave Planchon (see Nat. Hist. Review, 1865, p. 202).

The "disjointed" species, on the other hand, appear to have puzzled Prof. Grisebach, as they have done and will continue to puzzle all speculators on Geographical Botany. Grisebach endeavours to reduce their number as much as possible; sometimes by the discovery of intermediate stations; then, again, by presumed colonisation through man or other agencies; or by showing that supposed identical forms in distant areas are really distinct species, and, therefore, beyond the scope of inquiries limited to the age of now-existing species. But yet, in the Mediterranean as in the Japanese provinces, he is obliged to admit some which occupy two limited areas separated by enormous intervals. Thus, although he supposes that the appearance of *Rhododendron ponticum* on the coast of Portugal may have been the result of introduction by the Arabs, that *Geum heterocarpum*, now only known from the mountain regions of S. Spain and of Elborus in Persia, may yet be found in intermediate localities; yet such suppositions, he admits, can in no way account for the disseverence of the Cedar in the Atlas, the Lebanon, and the Himalaya, or of the *Pinus excelsa* in the mountains of Macedonia and the Himalayas. Unwilling to admit that these and other instances (far more numerous than acknowledged by Grisebach) of widely dissevered stations may be the remains of once continuous areas, he suggests the possibility of the transference of seeds by winds, birds, &c. Birds are, indeed, probably powerful assistants in the migrations of plants. But the effect of winds has been much overrated, as shown for instance by Kerner in a paper recently published in the *Zeitschrift des Deutschen Alpenvereins*, and is made more of perhaps by Grisebach in the present work than by any other observer, and not always on the safest data. Thus he attaches (p. 389) great importance to an "unpublished memorandum of Berthelot's," that is to a label to a specimen of *Erigeron ambiguus*, bearing the words "cette composée, qui a quelques rapports avec les Conyza, est devenue très-commune sur toutes les côtes de Ténériffe après le dernier ouragan." This memorandum is amplified into "On the Canary Islands whose flora was so well known to him, this traveller saw, immediately after a violent hurricane, an annual Synantherea (*Erigeron ambiguus*) which is generally dispersed over the Mediterranean flora, suddenly germinate and take permanent possession of the soil in the most diversified stations," the amplification thus including some half-a-dozen statements not contained in the original memorandum, adding especially the *propter hoc* to the *post hoc*. *Erigeron ambiguus* is one of those plants of which a single individual will produce seed enough to cover a considerable tract of country in the next following season, if favoured by a suspension of those counteracting influences which annually destroy all but one out of thousands, either in the state of seed or of the infant plant; and in Berthelot's memorandum we find no evidence either that the plant was not in the islands before the storm, or that the seed was actually brought by the storm, or that if so brought its germination and early growth were so exceptionally rapid, as to show the plant in an observable stage "immediately" after the storm. The inquiry, however, into the causes of the disseverance of areas, whether due to the gradual extinction of old races, or to the colonisation of new ones, remains one of the most interesting problems for solution in Geographical Botany.

OUR BOOK SHELF

Consumption, and the Breath Rebreathed. By Henry MacCormac, M.D. (London: Longmans, 1872.)

THIS work is written *con amore* by an enthusiastic physician, who has satisfied himself of the truth of the theory he advances, and is now desirous of convincing the rest of the world. The theory broached by Dr. MacCormac is that phthisis or pulmonary consumption, as well as tubercle generally, is always and exclusively the result of the breathing of air that has already been vitiated by respiration. It is well known that air that has once passed through the lungs has undergone important changes. Its oxygen is reduced in quantity, a nearly corresponding amount of carbonic acid has been added, and it also contains certain organic compounds the nature of which has not been very satisfactorily determined, but which are undoubtedly of an effete nature, and analogous in their composition to the disintegrated organic compounds eliminated from the body by the other excretory organs. The extremely deleterious action of the re-introduction into the system of the materials discharged by the intestines is now very generally known, from the inquiries that have been instituted into the nature and origin of typhoid fever; and Dr. MacCormac is perfectly justified from analogy in attributing serious results to the re-introduction into the system by the lungs of the air which has once passed through it, and which is consequently charged with decomposing substances. The carbonic acid alone is bad enough, but even if this were removed as fast as formed and replaced by oxygen, while the animal still continues to breathe the air it has already expired, there can be little doubt that it would speedily feel the effects of the other impurities with which expired air is charged. Under ordinary circumstances the only means of avoiding these effects is to permit free access of air to all and every apartment in which man is confined either by day or night; and so far we cordially endorse the views and recommendations of the author of the work before us. But when Dr. MacCormac states that tubercle is exclusively the result of breathing expired air, we think he carries his theory too far. We cannot put aside in the facile manner he adopts the influence of hereditary predisposition, nor the effects of exposure to damp and cold, when combined with insufficient food. Imperfect ventilation is so common that it is almost always as-

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